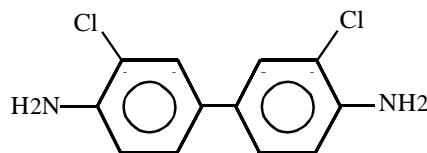


## 3,3'-DICHLOROBENZIDENE

3,3'-Dichlorobenzidine is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 91-94-1

Molecular Formula:  $C_{12}H_{10}Cl_2N_2$



3,3'-Dichlorobenzidine occurs as a grey to purple crystalline solid. It is insoluble in cold water but soluble in ether, benzene, glacial acetic acid, and alcohol (Merck, 1989; NTP, 1991).

### Physical Properties of 3,3'-Dichlorobenzidine

Synonyms: 3,3-dichloro-4,4'-biphenyldiamine; DCB; 4,4'-diamino-3,3-dichlorobiphenyl; 3,3'-dichlorobenzidine

Molecular Weight:	253.13
Boiling Point:	402 °C
Melting Point:	132 - 133 °C
Vapor Pressure:	$4.2 \times 10^{-7}$ mm Hg at 25 °C
Log Octanol/Water Partition Coefficient:	3.51
Water Solubility:	3.1 mg/l at 25 °C
Conversion Factor:	1 ppm = 10.35 mg/m <sup>3</sup>

(Howard, 1990; HSDB, 1991; Merck, 1989; U.S. EPA, 1994a)

## SOURCES AND EMISSIONS

### A. Sources

3,3'-Dichlorobenzidine is used as an intermediate in the manufacture of pigments or as a curing agent in polyurethane elastomers. In the United States, there are strict regulations requiring its use in closed systems (HSDB, 1991). The primary stationary sources that have reported emissions of 3,3'-dichlorobenzidine in California are commercial printing and publishing industries (ARB, 1997b).

## B. Emissions

The total emissions of 3,3'-dichlorobenzidene from stationary sources in California are estimated to be less than 1 pound per year, based on data reported under the Air Toxics "Hot Spots" Program (AB 2588) (ARB, 1997b).

## C. Natural Occurrence

No information about the natural occurrence of 3,3'-dichlorobenzidene was found in the readily-available literature.

## **AMBIENT CONCENTRATIONS**

No Air Resources Board data exist for ambient measurements of 3,3'-dichlorobenzidene.

## **INDOOR SOURCES AND CONCENTRATIONS**

No information about indoor sources and concentrations of 3,3'-dichlorobenzidene was found in the readily-available literature.

## **ATMOSPHERIC PERSISTENCE**

3,3'-Dichlorobenzidene is expected to exist in the particle phase in the atmosphere, and hence be subject to dry and wet deposition. The average half-life and lifetime for particles in the troposphere is estimated to be about 3.5 to 10 days and 5 to 15 days, respectively (Balkanski et al., 1993; Atkinson, 1995).

## **AB 2588 RISK ASSESSMENT INFORMATION**

The Office of Environmental Health Hazard Assessment reviews risk assessments submitted under the Air Toxics "Hot Spots" Program (AB 2588). Of the risk assessments reviewed as of December 1996, 3,3'-dichlorobenzidene was not listed in any of the risk assessments (OEHHA, 1996a,b).

## **HEALTH EFFECTS**

Probable routes of human exposure to 3,3'-dichlorobenzidene are inhalation and dermal contact (HSDB, 1991).

Non-Cancer: Very little information is known about the effects caused by short-term exposure to 3,3'-dichlorobenzidene. Severe eye and respiratory tract irritation have been observed in results from animal studies. Long-term dermal exposure may cause dermatitis

in humans. The United States Environmental Protection Agency (U.S. EPA) has not established an oral Reference Dose for 3,3'-dichlorobenzidene, and has determined that the data are inadequate to establish a Reference Concentration (RfC) (U.S. EPA, 1994a).

No information is available on adverse reproductive or developmental effects of 3,3'-dichlorobenzidene in humans. Abnormal growth was observed in the kidneys of the fetuses of pregnant mice treated subcutaneously with 3,3'-dichlorobenzidene in animal reproductive and developmental studies (U.S. EPA, 1994a).

Cancer: Increased tumors at a variety of sites were reported in animal studies from oral exposure to 3,3'-dichlorobenzidene. The U.S. EPA has classified 3,3'-dichlorobenzidene in Group B2: Probable human carcinogen (U.S. EPA, 1994a). The U.S. EPA calculated an oral unit risk estimate of  $1.3 \times 10^{-5}$  (microgram per liter)<sup>-1</sup>. The U.S. EPA estimates that if an individual were to ingest water containing 3,3'-dichlorobenzidene at 0.08 micrograms per liter over an entire lifetime, that person would theoretically have no more than a 1 in 1 million increased chance of developing cancer. The International Agency for Research on Cancer has classified 3,3'-dichlorobenzidene in Group 2B: Possible human carcinogen (IARC, 1987a).

The State of California under Proposition 65 has determined that 3,3'-dichlorobenzidene is a carcinogen (CCR, 1996). The inhalation potency factor that has been used as a basis for regulatory action in California is  $3.4 \times 10^{-4}$  (microgram per cubic meter)<sup>-1</sup> (OEHHA, 1994). In other words, the potential excess cancer risk for a person exposed over a lifetime to 1 microgram per cubic meter of 3,3'-dichlorobenzidene is estimated to be no greater than 340 in 1 million. The oral potency factor that has been used as a basis for regulatory action in California is 1.2 (milligram per kilogram per day)<sup>-1</sup> (OEHHA, 1994).

